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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/628,988	07/28/2003	Chih-Ming Lin	22877-6230	7161

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David A. Hall
Heller Ehrman White & McAuliffe LLP
7th Floor
4350 La Jolla Village Drive
San Diego, CA 92122-1246

EXAMINER

LAVARIAS, ARNEL C

ART UNIT PAPER NUMBER

2872

DATE MAILED: 07/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/628,988

Applicant(s)

LIN ET AL.

Examiner

Arnel C. Lavarias

Art Unit

2872

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7/28/03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

2. The drawings were received on 7/28/03. These drawings are objected to for the following reason(s) as set forth below.
3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference character(s) mentioned in the description:
Figure 1- Reference numeral 61.
Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

5. The abstract of the disclosure is objected to because of the following informalities:

Abstract, line 3- delete 'is disclosed. The system'

Abstract, line 10- insert ', ' after 'position'.

Correction is required. See MPEP § 608.01(b).

6. The disclosure is objected to because of the following informalities:

Page 1, line 13- insert 'are' after 'sizes'

Page 1, line 20- 'proposed,.' should read 'proposed.'

Page 2, line 24- 'recording' should read 'recording.'

Page 5, line 14- delete 'f'

Page 7, line 21- 'fincident' should read 'incident'

Page 10, line 24- 'Fig 4' should read 'Fig 9'

Page 12, line 16- 'djustment' should read 'adjustment'.

Appropriate correction is required.

Claim Objections

7. Claim 8 is objected to because of the following informalities:

Claim 8, line 3- 'theincident' should read 'the incident'.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1, 5, 11, 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Tanaka (U.S. Patent Application Publication US 2002/0057486A1).

Tanaka discloses a compact holographic data storage system (See for example Figures 1, 7, 9, 10) comprising a volume holographic recording medium (See 10 in Figure 1) for storing superimposed interference patterns; a laser beam emitting assembly (See 11 in Figure 1) having a large output area for emission of parallel laser beams with proper wavelength and cross sectional shape; a beam splitter (See 13 in Figure 1) being disposed in the optical path of parallel beams for separating out a portion of the parallel beams; a beam steering system (See 18 in Figure 1) for steering the partially separated beam as reference beam, such that the reference beam can be directed into the volume holographic recording medium with a proper incident position and angle and cross-sectional phase distribution; and a spatial light modulator (See 15 in Figure 1) comprising of light gating

components disposed in the optical path of parallel beams for holographic data input; a photodetector (See 20 in Figure 1) as two dimensional grating format for detecting regenerated signal after the reference beam is directed to the volume holographic recording medium, during data read from the holographic medium. Tanaka additionally discloses the beam splitter disposed in the optical path of parallel beams being composed of a reflective mirror for separating out a portion of the parallel beams in slices as reference beam to be directed to the beam steering system (See 13 in Figure 1, which acts as a partially reflecting beamsplitter); the spatial light modulator is implemented with a two dimensional transmissive LCD panel for controlling on/off of the light gating components as parallel beams pass therethrough serving as input apparatus to the holographic recording medium (See 15 in Figure 1); and the photodetector is implemented with a CCD camera for detecting the reconstructed beam as the reference beam enters the volume holographic recording medium acting as a data readout apparatus for the holographic medium (See 20 in Figure 1).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka in view of Rakuljic et al. (U.S. Patent No. 5684611).

Tanaka discloses the invention as set forth above in Claim 1, except for the laser comprising either a group of laser diodes with different wavelengths and with a servo mechanism for fixing laser diode with selected wavelength, or a single tunable wavelength laser. However, Rakuljic et al. teaches a holographic data recording system (See for example Figures 10-12), wherein the light source for the system includes either a group of laser diodes with different wavelengths and with a servo mechanism for fixing laser diode with selected wavelength (See 61, 62, 63 in Figure 12), or a single tunable wavelength laser (See 22, 23, 38 in Figure 10). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the laser source of Tanaka comprise either a group of laser diodes with different wavelengths and with a servo mechanism for fixing laser diode with selected wavelength, or a single tunable wavelength laser, as taught by Rakuljic et al., for the purpose of enhancing storage capacity via wavelength multiplexing of the recorded holograms.

12. Claims 2, 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka in view of Rakuljic et al. as applied to Claims 1, 3 above, and further in view of Ashizaki (U.S. Patent Application Publication US 2003/0007129A1).

Tanaka in view of Rakuljic et al. discloses the invention as set forth above in Claims 1, 3, except for the laser beam emitting assembly generating laser beams to pass through a cylindrical collimated lens and a rectangular aperture to become parallel beams with proper cross sectional shape. However, Ashizaki teaches a holographic recording device (See for example Figures 2A-B), wherein light emitted from the laser source (See 21 in Figure 2A) passes through a cylindrical collimated lens (See 28 in Figures 2A-B) and

rectangular aperture (See 29 in Figures 2A-B) prior to reaching the recording medium (See 3 in Figures 2A-B). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the laser beam emitting assembly generating laser beams to pass through a cylindrical collimated lens and a rectangular aperture to become parallel beams with proper cross sectional shape, as taught by Ashizaki, in the system of Tanaka in view of Rakuljic et al., for the purpose of preventing unwanted stray light from reaching the holographic recording medium.

13. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka in view of Brooks (U.S. Patent No. 3694657).

Tanaka discloses the invention as set forth above in Claim 1, except for the beamsplitter being composed of a narrow rectangular aperture for separating out a portion of the parallel beams in slices as reference beam to be directed to the beam steering system. However, Brooks teaches a holographic recording system for use in holographic correlation processing (See Figure 1), wherein the clear aperture of a deflecting prism is used to separate out a portion of the input laser light beam and generate a reference beam. The clear aperture of the deflecting prism presents a rectangular aperture, generating a reference beam of rectangular cross-section. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the beamsplitter be composed of a narrow rectangular aperture for separating out a portion of the parallel beams in slices as reference beam to be directed to the beam steering system, as taught by Brooks, in the system of Tanaka, to simplify and reduce the size and cost of the holographic optical system.

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14. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka.

Tanaka discloses the invention as set forth above in Claim 1. Tanaka additionally discloses numerous reflective mirrors (See for example 17, 18 in Figure 1; Paragraph 0007). Tanaka lacks a servo mechanism used to control the reflective angle of the mirror and mirror position to direct the reference beam into the volume holographic recording medium. However, the use of a mechanism, such as a servo and associated controller, to control the angle and position of mirror 18 in Figure 1 of Tanaka is implied and is obvious to one having ordinary skill in the art. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include a servo mechanism to control the reflective angle of the mirror and mirror position to direct the reference beam into the volume holographic recording medium in the system of Tanaka, to simplify the implementation of angle and spatial multiplexing in the holographic recording system, thus increasing read/write speed and storage capacity.

15. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka in view of Wuerker (U.S. Patent No. 3615123).

Tanaka discloses the invention as set forth in Claim 1, except for the beam steering system being an opto-electronic device using the built-in opto-electronic mechanism to control the incident position and angle of the reference beam into the volume holographic recording medium. However, Wuerker teaches a multiple exposure holographic recording system (See for example Figures 1, 2, 4), wherein deflection of the reference beam (See for example 16 in Figures 1, 2, 4) is accomplished by use of an electro-optic steering device in the form of an electro-optic retarder and birefringent crystal (See for

example 30, 31, 32 in Figure 2). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the beam steering system be an opto-electronic device using the built-in opto-electronic mechanism to control the incident position and angle of the reference beam into the volume holographic recording medium, as taught by Wuerker, in the system of Tanaka, to take advantage of increased rate/frequency of operation of the electro-optic devices, thus allowing for increased rates of recording.

16. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka in view of Horimai (U.S. Patent Application Publication US 2002/0114027A1).

Tanaka discloses the invention as set forth above in Claim 1, except for the beam steering system including a phase modulator, such as a transmissive LCD panel, in the optical path of the laser to modulate the reference beam with proper cross-sectional phase distribution. However, Horimai teaches a holographic recording system (See for example Figure 1) for recording data onto a holographic recording disk (See 1 in Figure 1). Additionally, a phase modulator in the form of a transmissive LCD screen is utilized in the beam paths of both the object and reference beams to impart a predetermined phase distribution onto these beams (See 17, 18 in Figure 1; Paragraphs 0126-0127). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the system of Tanaka include a phase modulator, such as a transmissive LCD panel, in the optical path of the laser to modulate the reference beam with proper cross-sectional phase distribution, as taught by Horimai, for the purpose of further increasing the storage capacity of the recording medium via phase multiplexing.

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17. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka in view of Dewald (U.S. Patent No. 5481523).

Tanaka discloses the invention as set forth above in Claim 1, except for the SLM being implemented with a two-dimensional reflective LCD panel for controlling reflection or no reflection on the light gating components as the parallel beams pass therethrough serving as an input apparatus to the holographic recording medium. However, Dewald teaches a holographic recording system (See for example Figures 2-3), wherein use of a reflective SLM in the form of an LCD panel is used to encode the object beam (See 64 in Figures 2-3; col. 4, line 45-col. 5, line 2). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the SLM be implemented with a two-dimensional reflective LCD panel for controlling reflection or no reflection on the light gating components as the parallel beams pass therethrough serving as an input apparatus to the holographic recording medium, as taught by Dewald, in the system of Tanaka, for the purpose of reducing the size of the holographic system.

18. Claims 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka.

Tanaka discloses the invention as set forth above in Claim 1. Additionally, Tanaka discloses the holographic recording medium being of a photorefractive material, such as lithium niobate doped with terbium (See Paragraphs 0004, 0067). Tanaka lacks the recording material being a photorefractive material such as iron doped lithium niobate or barium titanate, or an organic photosensitive material. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the recording

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material be a photorefractive material such as iron doped lithium niobate or barium titanate, or an organic photosensitive material, since it has been held to be within the ordinary skill of worker in the art to select a known material on the basis of its suitability for the intended use. One would have been motivated to have the recording material be a photorefractive material such as iron doped lithium niobate or barium titanate, or an organic photosensitive material, to take advantage of such materials having very high diffraction efficiency and photosensitivity, while maintaining nondestructive readout of the recorded holograms.

Conclusion

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 571-272-2315. The examiner can normally be reached on M-F 8:30 AM - 5 PM EST.

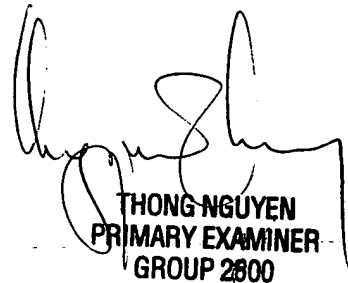
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Arnel C. Lavarias
7/26/04



THONG NGUYEN
PRIMARY EXAMINER
GROUP 2800